Body Composition

What is it and how is it measured?

Body Mass Index

Body Mass Index (BMI) is a calculated number based on your height and weight. This helps to classify what weight you should be based on your height. There is a standard BMI chart that your physician uses to calculate your BMI or you may calculate it using the following equation:

BMI Calculation =	Standard BMI Chart	
$\frac{\text{weight (pounds)}}{\text{height (inches)}^2}$ x 703	**Category**	**Value**
	Underweight	Less than 18.5
	Recommended	18.5 – 24.9
	Overweight	25.0 – 29.9
	Obese	30.0 and above

For example: Martha's height is 64" tall and she weighs 130 pounds. Therefore, her BMI would be:

$$\textbf{BMI} = \frac{130 \text{ (pounds)}}{64 \text{ (inches)} \times 64 \text{ (inches)}} \times 703 = 22.3$$

Martha's BMI of 22.3 and falls into the "recommended" range.

When calculating BMI, there are exceptions. For example, if you are a body builder with a large amount of muscle mass, you might have a higher weight than what is normally recommended. Therefore, you may fall into the "overweight" or "obese" category for BMI.

Visit the following website for more information regarding BMI:
http://www.cdc.gov/nccdphp/dnpa/bmi/adult_BMI/about adult BMI.htm

Percent Body Fat

Percent Body Fat is a number that describes what percentage of your body is fat mass compared to lean muscle mass. The machine used to measure your percent body fat is called the Omron Hand-Held Body Composition Analyzer has a 97% accuracy rate with a possible variation of 3% above or below the actual result. The body fat percentage is calculated by a formula that includes five factors: height, weight, age, gender, and electric resistance. The Omron estimates your percent body fat by sending a small electrical current (that you cannot feel) through the water content in your body (i.e. blood and muscles). Based on your body's resistance to that current (i.e. fat mass because there is no water in fat), it calculates your percent body fat.

There are several factors that affect the measurement of percent body fat result using this device. The most important include: dehydration; water retention; food, caffeine, and/or alcohol intake; exercise; and/or diuretics. Dehydration has the greatest impact on the measurement of percent body fat using this method. The American College of Sports Medicine Guidelines [(1)] for percent of body fat are listed below.

Category	Males (M)	Females (F)	Meaning	Educational Comments
Athlete	< 10%	< 17%	M: Approximately 90% or more of your body is muscle mass and approximately 10% or less is body fat.	Has more lean muscle mass. [2]
			F: Approximately 83% or more of your body is muscle mass and approximately 17% or less is body fat.	
Lean	10-15%	17-22%	M: Approximately 85-90% of your body is muscle mass and approximately 10-15% is body fat.	
			F: Approximately 78-83% of your body is muscle mass and approximately 17-22% is body fat.	
Normal	15-18%	22-25%	M: Approximately 82-85% of your body is muscle mass and approximately 15-18% is body fat.	Necessary for overall health because it plays an important role in protecting internal organs, provides energy, and regulates hormones that perform various functions in body regulation. [2]
			F: Approximately 75-78% of your body is muscle mass and approximately 22-25% is body fat	
Above Average	18-20%	25-29%	M: Approximately 80-82% or more of your body is muscle mass and approximately 18-20% is body fat	
			F: Approximately 71-75% of your body is muscle mass and approximately 25-29% is body fat	
Over-fat	20-25%	29-35%	M: Approximately75-80% of your body is muscle mass and approximately 20-25% is body fat	Excess fat, has been linked to a number of health problems such as increased risk for diseases such as cancer, diabetes, and heart disease.[2]
			F: Approximately 65-71% of your body is muscle mass and approximately 29-35% is body fat	
Obese	25+%	35+%	M: Approximately 75% or more of your body is muscle mass and approximately 25% or more is body fat	
			F: Approximately 65% or more of your body is muscle mass and approximately 35% or more is body fat	

For example, if you are dehydrated for any reason prior to your biometric screening, you may have a higher percentage of body fat reading because without the presence of water, the small electrical current will have more resistance. Therefore, you may fall into the "above average," "over-fat," or "obese" category for percent body fat. There are, however, exceptions. For example, you may have a high percent body fat, but look thin. The reason for this may be due to your muscle mass being lower compared to your body fat.

Sources:

[1] ACSM Guidelines for Exercise Testing and Prescription; 6th Ed., 2000 and ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription, 4th Ed., 2001.

[2] The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) is part of the National Institutes of Health (NIH) and the U.S. Department of Health and Human Services.